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Real Measurement Study for Rain Rate and Rain Attenuation Conducted Over 26 GHz Microwave 5G Link System in Malaysia

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Abstract

In this paper, real measurements were conducted to investigate the impact of rain on the propagation of millimeter waves at 26 GHz. The measurements were accomplished using a microwave fifth generation radio link system with 1.3 km path length implemented at Universiti Teknologi Malaysia Johor Bahru, Malaysia. The implemented system consisted of Ericsson CN500 mini E-link, radio unit, rain gauge, and data logger. The measurements were attained and logged daily for a continuous year, with 1-min time intervals. Next, the MATLAB software was used to process and analyze the annual rain rate and rain attenuation, including for the worst month. From the analyzed results, it was found that at 0.01% percentage of time, the rain rate was 120 mm/hr; while the specific rain attenuation was 26.2 dB/km and the total rain attenuation over 1.3 km was 34 dB. In addition, the statistics acquired from the measurements for the worst month were lower than what was predicted by the international telecommunication union (ITU) model; around 51% and 34% for the rain rate and rain attenuation, respectively. The average percentage of error calculated between the measurements and predicted results for the rain rate and rain attenuation were 143% and 159%, respectively. Thus, it can be concluded that the statistics for the worst month in Malaysia is lower than what was predicted by the ITU model.

Keywords

Author Keywords: Millimeter wave; rain attenuation; propagation; microwave 5G link; access 5G link; tropical regions; fifth generation systems

KeyWords Plus: TERRESTRIAL RADIO LINKS; SIZE DISTRIBUTION; PREDICTION METHOD; MILLIMETER WAVES; RATE STATISTICS; PROPAGATION; MODEL; TRANSMISSION; REGIONS; MONSOON

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